

DEUCE ALJOL

Operating instructions.

Failure dictionary.

Paper tape Codes.

1) Clear ID

Set on ID — 1P3

1P32 if no object program required.

1P31 if trace is required.

2) Paper tape punch

a) Parity OFF

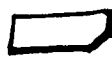
b) EE code

c) Prepare Key down once.

d) Tape magazine lower.

check tape.

e) Perforate Key Ignore.

3) Put translator program in card reader. 

Initiate (Silver Key) Key down once.

4) Tape Reader at load (light on bright)

Set at a) 8 Loh

b) Parity even

c) Read all ones down

d) Insert black (standard) plug.

e) Load ALGOL program tape

f) Load key level (light on dim)

4a) Possible restart.

Insert last card of translator

Initiate (Silver Key) Key down once

This produces failure back followed by the

object program or failure message.

If no failure message found.

5) Load Control Pack
Object Program
Failure Pack } in this order.



Set ID — ~~1 P 31~~

either 1 P 31 if trace required
or 1 P 32 all partial answers printed.
or 1 P n partial answers block level n only.

6) Load Data Tape with reader set at load (light on right) and:-
a) 5 hole
b) Parity off
c) Read all over down.
d) Black (standard) flag.

Set Load switch to level (light dim)

7) Load reader called (orange light on main panel)
Read in (yellow keys)

Stoppers during translation :-

- 0, 1 - 1 X normal end of translation (single shot to translate another tape - or read in control back if 1 P32 on ID)
- 4, 17 - 17 X end of print out of error message - single shot to translate another tape (there may be some redundant controls in the punch buffer)
- , -24 X Translator not read in and stand correctly.
buzz.

Stoppers during run time :-

- 7, 1 - 1 X Failure back not next in reader. (at FINISH)
(single shot to read failure back)
- 5, 3 - 3 X Failure back not next in reader (at a failure)
(single shot to read failure back)
- * 0, 5 - 5 X Control not stand correctly : DEUCE.
(single shot to re-attempt sum-check)
- 0, 7 - 7 X Object Program not next in reader.
(single shot to read Object Program)
- * 0, 9 - 9 X Object Program not read in correctly.
(single shot to re-read Object Program)
- * 0, 11 - 11 X Object Program not stand correctly
(single shot to re-attempt sum-check)

* Sum-check failures - alarm sounding.

Card Output

Failure Pack

First Card

123 P17 (110111) in 2nd half of first word.

Last Card

"All ones" and top row in α -field.

31 P1 and 31 P28 down rest of α field.

Object Program

First Card

1 P1, 3, 5, 7, 9, 11, 13, 15 in 1st half of 1st word.

Last Card

"All ones" in last non-zero word (β field)

Translation Failures

Miscellaneous

- 1) Program too big to compile.
- 2) Too many blocks.
- 5) Incorrect delimiter (including end message in middle of program.)
- 6) True or false incorrectly delimited.
- 7) Identifier incorrectly terminated by decimal point or ₁₀
- 8) Incorrect constant.
- 9) Constant too big.

Type Classes.

- 10) Incorrect type of identifier.
- 11) Incorrect dimensions or no. of parameters.
- 12) Constant not allowed here.
- 13) Neither constant nor identifier allowed here.
- 14) Label not allowed.
- 15) Non-type procedure not allowed.
- 16) Procedure of wrong type.
- 18) Must be single variable.
- 19) Identifier needed here.

Declarations

- 20) Delimiter not allowed in this position.
- 21) Incorrect use of a sequence of delimiters
- 22) Incorrect matching of delimiters.
- 23) Array segment incorrect.
- 24) Local variables used in array bounds.
- 25) Own array not allowed in this system.
- 26) Incorrect switch declaration.
- 27) Identifier used but not declared.
- 28) Identifier already declared.
- 29) Declaration not at beginning of block

Procedure Declarations.

- 30) Delimiter not allowed in this position.
- 31) Incorrect use of a sequence of delimiters.
- 32) Incorrect matching of delimiters.
- 33) Incorrect parameter delimiters.
- 34) This type not allowed.
- 35) Formal para. part error.
- 36) Value or specification part error.
- 37) Too many or too few identifiers specified.
- 38) Type procedure contains no assignment to procedure identifier.

Procedure Calls

- 40) Delimiter not allowed in this position.
- 41) Incorrect use of a sequence of delimiters.
- 42) Incorrect matching of delimiters.
- 43) Incorrect parameter delimiter.
- 44) Incorrect use of procedure.

Expressions

- 50) Delimiter not allowed in this position.
- 51) Incorrect use of a sequence of delimiters.
- 52) Incorrect matching of delimiters.
- 53) Delimiter must be arithmetic, not relational or logical.
- 54) Two relational operators cannot be consecutive.
- 55) Incorrect subscript variable.

Statements and General

- 60) Delimiter not allowed in this position.
- 61) Incorrect use of pair of delimiters.
- 62) Incorrect matching of delimiters.
- 66) Incorrect termination of statement.
- 67) End cannot occur in declarations.
- 68) No end message at end of program.
- 69) Incorrect beginning of program.

Run Time failures

Data Input (2c)

- 100) $-2^{127} > x \geq 2^{127}$
- 101) x incorrectly dealt with by read routine (check number of decimal digits: $x \leq 9$)
- 102) x contains non valid character.

Size of Numbers (2c)

- 104) Real x too big ($-2^{22} > x \geq 2^{22}$) to convert to integer.
- 105) $-2^{22} > x \geq 2^{22}$ (NEG, FLOAT, \div , $+$, $-$) (integer)
- 107) $-2^{127} > x \geq 2^{127}$ (x , $/$, $+$, $-$, $>$, \geq , $<$, \leq , NEG, ABS) (real)
- 108) Divisor = 0 ($/$)
- 109) $-2^{22} > x \geq 2^{22}$ (x) (integer)
- 110) Divisor = 0 (\div)

Procedure Calls

- 111) Incorrect number of parameters.
- 112) Actual parameter incompatible with formal parameter called, name.
- 113) Arithmetic formal parameter called by name and used on LHS of an assignment statement does not have an actual parameter of the same type.
- 114) Label or boolean actual parameter not of same type as formal parameter (called by name or value)
- 115) Arithmetic actual parameter incompatible with formal parameter called by name or value.
- 116) Array actual parameter type incompatible with formal array called by value.
- 117) Base address of array given as actual parameter to formal array called by value is too big ($\geq 2^{31}$)
- 118) Actual parameter to an algebraic formal parameter called by name or value is not algebraic.

Incorrect Types

- 119) x not boolean in not x
- 120) Expression F of while element in a for statement is not boolean
- 121) Expression following if of an if clause is not boolean.
- 123) Expression not arithmetic ($<, \leq, =, \geq, >, \neq, +, -, \times, /$)
- 124) x not arithmetic in $:= x;$
- 125) Expression not boolean (and, or, xor, in)
- 126) Expression not integer (\div)

Assignments

- 128) LHS not an algebraic address.
- 129) RHS not an algebraic result.
- 130) Boolean address with arithmetic result, or arithmetic address with boolean result.
- 131) LHS's of a multi-assignment statement are not all of the same type.

Switches

- 133) Switch index out of range.

Subscripted Variables

- 135) Subscripted identifier is not algebraic variable (or switch designator)
- 136) Incorrect number of dimensions in subscript list.

Calculation & Array Address (A)

- 137) A too big to store ($\geq 2^{31}$)
- 138) A too small (is below bottom of stack)
- 139) A not within array specified.

Array Declarations

- 141) Negative number of elements in an array dimension.
- 142) Array bound is not an arithmetic expression.

Calculation of Array Addressing Mechanism

- 143) Starting address of array too big to store ($\geq 2^{15}$)
- 144) Calculation of base address / mapping function too big to store ($\geq 2^{31}$)
- 145) Calculation of starting address, base address or mapping function too big ($\geq 2^{15}$)

Use of the operator \uparrow ($x \uparrow y$)

- 146) x or y not arithmetic expression.
- 147) $x = y = 0$
- 148) $x < 0$ (y real)
- 149) $x = 0, y < 0$ (y real)
- 150) $-2^{22} > (x \uparrow y) \geq 2^{22}$ (x and y integer; $y > 0$)

Standard Functions ($f(x)$)

- 160) ln $x < 0$
- 161) ln $x = 0$
- 162) exp $|x| \geq 2^{12}$
- 163) exp $e^x \geq 2^{127}$
- 164) int $-2^{22} > x \geq 2^{22}$
- 165) atan $-2^{127} > \text{calculation} \geq 2^{127}$
- 166) sin $-2^{16} > (2x)/\pi \geq 2^{16}$
- 167) cos $-2^{16} > (2x+1)/\pi \geq 2^{16}$
- 168) sgt $x < 0$
- 169) denue track number invalid.

Probable machine/object program errors.

- 196) Syllable number of next operation is above top of Object Program.
- 198) Control - trying to get at a stack address below the bottom of the stack.

Stack Capacity

- 199) No more storage space left - DENUE.

	VALUE	FS	LS
	0	FS	FS
	1	1	A
	2	2	B
	3	*	C
	4	4	D
	5	(E
	6)	F
	7	7	G
	8	8	H
	9	≠	I
	10	=	J
	11	-	K
	12	≈ (v)	L
	13	LF	M
	14	space	N
	15	?	O
	16	0	P
	17	>	Q
	18	≥	R
	19	3	S
	20	→	T
	21	5	U
	22	6	V
	23	/	W
	24	∅(x)	X
	25	9	Y
	26	+	Z
	27	LS	LS
	28	·	·
	29	i(n)	?
	30	CR	π(£)
	31	Delete	Delete.
	32		

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			0	
0			0	0
	0			
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	0	0		0
	0	0	0	
0	0	0	0	0

Left hand digit - parity
 other - binary

Parity - ODD.

+

-

.

LF

Space.

Delete.

Card reproducer.

Insert punched cards in left hand hopper.

Clipped corner back right.

Insert blank cards in right hand hopper.

Clipped corner back right.

Key 3 times to punch.

Key 3 times to run out.

Mechanical Typewriter.

Insert drum card with clipped corner at top and to the left (flair edge) of clamp and close clamp.

Insert cards (program) in card reader with clipped corner at top right & first card at front.

Operate lever to clamp drum in position.

Switch on the card reader.

Switch on the type writer console.

Switch on the type writer.

Insert paper.

Key for read

Key for run out.